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ABSTRACT

Nashville State Technical Institute is currently involved in an Advanced Technology Articulation Demonstration Project, a collaborative effort with Tennessee State University (TSU), two local high schools, the Tennessee Valley Authority (TVA), the Center for Occupational Research and Development (CORD), and the State Department of Education. The various cooperating agencies are each responsible for certain aspects of the project. Serving as the coordinator of the project, Nashville Tech: (1) formulated an industrial advisory group to review program articulation and advise on competencies to be taught; (2) entered into an articulation agreement with the two local school systems, identified the two high schools to be included in the project, and assisted in the implementation of a CORD-developed Principles of Technology course at the two schools; (3) developed an Advanced Principles of Technology laboratory with TVA funding; and (4) in cooperation with CORD and the State Department of Education, provided training in advanced technology to high school instructors. The two local school systems implemented the Principles of Technology course, developed a hands-on laboratory, selected instructional staff for training, and arranged for counselor orientation. TSU's role was primarily in the area of project evaluation, while CORD's main function was to advise on the implementation of the Principles of Technology course. Project funding came from the TVA and State Department of Education. The first year of the program has convinced both faculty and administrators at Nashville Tech that the project is beneficial. Course outlines are appended. (AYC)

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DEVELOPING A TECHNOLOGY ARTICULATION PROGRAM

The Need for Ariculation

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JC 870 198

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DEVELOPING A TECHNOLOGY ARTICULATION PROGRAM

The Need For Articulation

Over ten years ago the Carnegie Commission's study entitled Continuity and Discontinuity noted that in the future school-college relations will require

> . . . closer articulation between the schools and the colleges. They can no longer be such worlds apart. High administrative barriers between the systems and broad moats separating school teachers and college professors from each other have been created, and they artificially and harmfully impede the learning experience for students. The barriers should be lowered and more bridges built across the moats (Carnegie Commission 1973, 109).

While some barriers have been lowered and some bridges built across the moats, today too many barriers and too few bridges still exist. Unfortunately, the numerous national reports in the 80's concerning education focused on strengthening general educational requirements while, at best, glossing over or, at worst, ignoring opportunities for articulation between high schools and colleges.

In one of the most famous of these reports, A Nation at Risk (1983) the National Commission on Excellence in Education noted that

> More and more young people emerge from high school ready neither for college nor for work. This predicament becomes more acute as the knowledge base continues its rapid expansion, the number of traditional jobs shrink, and new jobs demand greater sophistication and preparation (12).

In fact, the percentage of students in the general education track, the track that prepares students neither for college nor for work, a track that essentially leads nowhere, in high school grew from 12% in 1969 to 42.5% in the period 1975-1981 (Parnell 1985, 37).

Dale Parnell in The Neglected Majority persuasively advocates the 2 + 2 tech-prep/associate-degree program as the most appropriate curriculum to meet the needs of this ever-growing body of students. Parnell presents the case for the 2 + 2 tech-prep program eloquently, maintaining, correctly in my opinion, that "It is the rare high-school student who has more than a vague notion of what an adequate high-school preparatory program is all about and how he or she can best prepare to succeed in a community, technical, or junior college program" (Parnell 1985, 109). To be successful, the 2 + 2 tech-prep program requires that the high schools and community, junior, and technical colleges work together to emphasize the knowledge and skills required for one to complete a program rather than merely to define entry requirements as is typically done today. Parnell accurately and cleverly notes that, "In far too many instances college-graduation requirements appear to represent a treaty drawn among warring nations rather than a rational, research-based program of study" (Parnell 1985, 113). His proposed 2 + 2 tech-prep/associate-degree program combines "a common core of learning and technical education and will rest upon a foundation of basic proficiency in math, science, communications, and technology--all in an applied setting" (Parnell 1985, 143-144).

The Education Commission of the States' recent report noted that "what is considered necessary preparation for work also seems to be shifting," with employers placing greater emphasis on workers' critical thinking and interpersonal skills (1986, 12). One of the eight challenges outlined in the report is "not simply to prepare students for work or to improve undergraduate education . . . It is, instead, to restore the balance between specialized training aimed at preparing students for a single career, and general education, aimed at . . . preparing students for life" (Education Commission of the States 1986, 12). Recommendation 11 in the

report which encourages schools and colleges to provide educational alternatives for 16-year old students suggests that one such alternative is "to set up programs that combine the last two years of high school with the first two years of postsecondary education" (Education Commission of the States 1986, 26).

The type of articulation arrangement outlined in this paper strives to achieve balance between specialized training and general education while building upon student's knowledge gained in high school.

Types of Cooperative Agreements

The majority of cooperative agreements between community, technical, and junior colleges fall into four categories:

1. Joint enrollment, the most common, but in reality not a truly collaborative effort
2. Sharing of faculty and/or facilities, a program that requires cooperation but little real program articulation or collaboration
3. Advanced placement, which requires little collaborative commitment
4. Program coordination efforts, found more infrequently, but both the most important type of cooperation and the most difficult to sustain (Parnell 1985, 116-117).

Description of Nashville Tech's Technology Articulation Program

Nashville State Technical Institute, one of fourteen two-year collegiate institutions in the State University and Community College System of Tennessee, has for years engaged in various collaborative efforts with other colleges, schools, businesses, and industries. Today, I want to share with you information about just one such effort which involves Nashville Tech, Tennessee State University, two local high schools in two different school districts, the Tennessee Valley Authority (TVA), The

Center for Occupational Research and Development (CORD), and the State Department of Education. Being a perceptive audience, you probably have guessed by now that this cooperative agreement truly reflects program coordination efforts.

Nashville Tech's Advanced Technology Articulation Demonstration Project is designed as a model or demonstration program, one to develop an advanced technology program to demonstrate to other [Tennessee] Valley educational institutions the efforts necessary to train for the technical jobs of the future. While this program is not precisely the 2 + 2 tech-prep program Parnell advocates, it is similar and is designed to reach that ever-growing body of students.

Prior to this program being developed, business and industrial representatives indicated to Nashville Tech that a need existed for a high technology "generalist" with training in the integrated system approach to the high technology fields. Almost simultaneously, the Tennessee Valley Authority approached Nashville Tech about being involved in a demonstration project in high technology. After reviewing the need for such training and the items proposed by TVA, Nashville Tech faculty and administrators felt that the highly technical courses, because of their nature, should be taught at the postsecondary level. They felt that a number of prerequisites to these highly technical courses, however, were certainly appropriate for the high school curriculum.

Today, most programs at the high school level ignore the problem of training for advanced technologies. The Center for Occupational Research and Development (CORD) in Waco, Texas has developed a Principles of Technology course dealing with the principles and concepts that underlie high technology and the four kinds of systems comprising technological devices and equipment: mechanical, fluid, thermal, and electrical. This

course, presenting both "pure physics" and "applied physics," is designed to provide high school students with better science and mathematics backgrounds and to enable them to enroll directly in the advanced technology courses at Nashville Tech. The Articulation Demonstration Project provides for the Principles of Technology course to be taught at two local high schools, W. C. Yates Vocational Center in Williamson County and Hillwood High School in Metropolitan Nashville. Because of the articulation agreement, Nashville Tech awards appropriate postsecondary credit for the high school courses involved.

Simultaneously, Nashville Tech is offering for the first time in the fall of 1986 a postsecondary principles course, the Unified Technical Concepts physics course also developed by CORD. Each of the physics courses in this three-course sequence is comprised of a three-credit hour lecture and a one-credit hour laboratory. These courses are required in the Automation Robotics Technology curriculum this current year and are under consideration to replace the existing physics courses in some of the other engineering technologies perhaps as early as the next academic year.

The various cooperating agencies are each responsible for certain aspects of the articulation project. Serving as the coordinator of the project, Nashville Tech formulated the industrial advisory group to review program articulation and to advise on specific competencies to be taught. Nashville Tech entered into the articulation agreement with the two local school systems, identified the two high schools with TVA's concurrence to be included in the project, and assisted in the implementation of new curriculum at the two high schools selected to participate. With funding from TVA, Nashville Tech worked with the high schools to develop laboratories for the "Principles of Technology" course by writing bid specifications, selecting, and ordering equipment. At the collegiate campus, we

developed an "Advanced Principles of Technology" laboratory with TVA funding of approximately $125,000. To develop this laboratory, the Nashville Tech faculty reviewed the 90 experiments proposed by CORD for the Unified Technical Concepts course, selected those best suited for the Nashville Tech curriculum, and purchased the necessary equipment to perform the experiments. Because the Unified Technical Concepts is a three-course series, Nashville Tech is still in the process of purchasing the equipment for the third course in the series. And, finally Nashville Tech faculty participated in "Principles of Technology" leadership, implementation, and evaluation committees.

Working with CORD and the State Department of Education, Nashville Tech provided training in advanced technology to high school instructors who are teaching the "Principles of Technology" courses for the first time this fall. As well as the instructors from the two high schools for this articulation project, twenty-four other instructors from across the state who will be teaching this course for the first time attended training on Nashville Tech's campus in the summer of 1986. During this week-long training, the high school teachers basically studied the first three units of the Principles of Technology course. They viewed the introductory videotapes for each unit which explain why various things are important and how the concepts could be taught, solved the math problems designed for students, and performed the various experiments in these first three units. In addition, the teachers had access to videotapes for all of the units, and some elected to view these tapes on their own time.

As a result of entering into the articulation agreement, the two local school systems implemented a "Principles of Technology" course and developed a hands-on laboratory to complement the course with funds available from the project. Teacher qualifications for this course were reviewed by both

the local school system and Nashville Tech. Using contract funds, individuals who were selected to teach the high school course attended the "Principles of Technology" seminar on Nashville Tech's campus. As part of the project, the school systems agreed to teach "Principles of Technology" for at least three years at the two selected high schools. Like their counterparts at Nashville Tech, representatives from the school systems have participated in "Principles of Technology" leadership, implementation, and evaluation committees. In addition, counselors from the school are to be involved in an advanced technology counseling orientation which will familiarize them with the program. This orientation is scheduled to occur during the second semester.

Tennessee State University's role is primarily in the area of evaluation. The University will develop and administer an evaluation process of the entire advanced technology project and a testing procedure for students in the program. In addition, representatives from Tennessee State will participate in the industrial advisory group.

CORD's primary function was to advise on the implementation of the "Principles of Technology" course in cooperation with the various educational institutions, to provide both the high schools and Nashville Tech with copies of the curriculum developed, and to develop specifications for the laboratories at both the high schools and Nashville Tech. Representatives from CORD participated, particularly in the early stages of the project, in Nashville Tech's Automation Robotics Advisory Council meetings, providing information as requested.

Funding for the project came from two sources. TVA provided the bulk of the funding for the project, approximately $360,000, with $260,000 of this devoted to equipment for the laboratories both at Nashville Tech's

campus and at the local high schools. In addition, the State Department of Education provided funding for the training of the high school teachers from across the state.

Thus far, the cooperating agencies have worked well together, each performing his role to ensure the success of the project. During the latter part of the 1985-1986 academic year and during the current academic year, two Nashville Tech faculty have been assigned 25% of their load in this project, one as project manager and the other as project coordinator. Project staff spent much of the first months evaluating existing laboratory equipment and facilities at the selected high schools, preparing equipment bid packages, bidding the equipment, receiving and evaluating bids, ordering equipment, and making sure that it was installed at each high school.

Before the technology courses were offered, both Nashville Tech faculty and high school instructors attended regular training sessions provided by CORD. The project coordinator, a Nashville Tech physics instructor, attended a three-day seminar offered by CORD. In addition, both the project manager and coordinator attended a two-day seminar in nearby Huntsville, Alabama. As described earlier, the week-long training session for high school teachers was held on Nashville Tech's campus. Also, the Fall 1986 Instructor Workshop for Unified Technical Concepts will be conducted by CORD on Nashville Tech's campus on October 23-24. This day and a half workshop is designed for faculty and administrators of post-secondary technical and community colleges and instructors who will be teaching the Unified Technical Concepts course.

Conclusion

Parnell notes in The Neglected Majority (1985) that "collaboration and program articulation are not easy" (119). Nashville Tech's experience in the Technology Articulation Program would confirm this opinion. But the experience would also confirm that the benefits of the articulation project far outweigh the effort.

Parnell also offers certain caveats concerning articulation which both faculty and administrators at Nashville Tech feel are important after working on this project:

1. Early in the discussions, agreement should be reached on the priorities for action.
2. Participants should receive some recognition and rewards, including reduced work loads.
3. Someone must serve as director of the project.
4. A specific charge of duties for the participants outlining purpose, time-lines, and dates should be developed.
5. Periodic progress reports are extremely important.
6. A written program-coordination agreement must be developed and be widely distributed.
7. If articulation agreements are developed for long-term, they should be reviewed annually (Parnell 1985, 119-120).

A contract for the Technology Articulation Program outlining the specific duties of each of the participants was developed. If the contract or written agreement for an articulation program is carefully thought through, it should incorporate the other items Parnell listed. For Nashville Tech's Technology Articulation Program the agreement was effective because it was simultaneously comprehensive, inclusive, detailed, and specific.

Although this is the first year of the program, both faculty and administrators at Nashville Tech are convinced the project is beneficial. Secondary students at the two high schools are receiving training that would not otherwise be available. Because of the project, the high schools and Nashville Tech were able to equip laboratories for the unified or advanced courses. Both high school teachers and Nashville Tech faculty received up-to-date technical training. But best of all, representatives from Nashville Tech and the local school systems opened up new avenues of communication. In an era of declining enrollments the fact that Nashville Tech will attract some additional students in the future because of this project is, of course, not an unimportant consideration.

Through articulation agreements such as the one Nashville Tech has developed, barriers between high school systems and colleges are being lowered and bridges are being built. Admittedly, lowering barriers and building bridges, even with carefully developed articulation agreements, is not easy. But for the future of our youth, the future of our country, and the future of our institutions, we must work to see that the progress we have made in this area continues. In spite of the tremendous effort required, we must continue to lower barriers and build bridges.

References

Boyer, Ernest, ed. High School: A Report on Secondary Education in America, A Report of the Carnegie Foundation for the Advancement of Teaching. New York: Harper and Row, 1983.

The Carnegie Commission on Higher Education. Continuity and Discontinuity: Higher Education and the Schools. A Report and Recommendations by The Carnegie Commission on Higher Education. New York: The McGraw-Hill Book Company, 1973.

Education Commission of the States. Transforming the State Role in Undergraduate Education. Time for a Different View: The Report of the Working Party on Effective State Action to Improve Undergraduate Education. Denver: Education Commission of the States, 1986.

Kintzer, Frederick C., ed. Improving Articulation and Transfer Relationships in New Directions for Community Colleges edited by Arthur M. Cohen, No. 39. San Francisco, Jossey-Bass, 1982.

The National Commission on Excellence in Education. An Open Letter to the American People: A Nation at Risk: The Imperative For Educational Reform. Washington, D.C.: United States Department of Education, 1983.

The National Task Force on Educational Technology. "Transforming American Education: Reducing the Risk to the Nation: A Report to the Secretary of Education, United States Department of Education." T.H.E. (Technological Horizons in Education) Journal 14, no. 1 (August 1986): 58-67.

Parnell, Dale. The Neglected Majority. Washington, D.C.: The Community College Press, 1985.

"Principles of Technology Field Test." Voc Ed - Journal of the American Vocational Association 60, no. 1 (January/Februaruy 1985): 10.

Selland, Larry G. "The Principles of Technology Project." Voc Ed -Journal of the American Vocational Association 59, no. 2 (March 1984): 27-29.

Date Revised: May 7, 1987
By: Robert S. McDow

COURSE INFORMATION

COURSE NAME: Unified Technical Concepts--- (UTC) Physics I

COURSE NUMBER: PH 113, 111

CREDIT HOURS: 4 LECTURE: 3 (PH 113) LAB: 1 (PH 111)

INSTRUCTOR'S NAME:

OFFICE HOURS: OFFICE NUMBER: OFFICE PHONE:

COURSE DESCRIPTION: An applied course in physics based upon a unified approach to the concepts. Four energy systems are defined: Mechanical, Fluidal, Electrical, and Thermal. Force is defined for a mechanical system. Then force-like quantities are defined for rotating mechanical systems (torque), fluidal systems (pressure difference), electrical systems (voltage), and thermal systems (temperature difference). Strong use of analogies among the four systems constitutes the unified method. Besides force and force-like quantities; work, rate and momentum are also covered. Dimensional analysis is emphasized throughout.

COURSE OBJECTIVES: After completing this course, the student should be able to:

1. Define physical quantities such as force, torque, pressure, voltage, temperature difference, velocity, angular velocity, volume flow rate, mass flow rate, and momentum.
2. State the Metric and English units of all of the above quantities and convert from one system to the other.
3. Solve equations involving all of the above quantities (i.e. given two quantities, calculate the third).
4. Add and subtract force vectors.
5. Identify those quantities for which the analogies are valid in each of the operating systems.
6. Perform lab experiments related to the principles using specially designed equipment.

TEXTBOOKS:

Unified Technical Concepts-Physics for Technicians, 2nd Edition, Center for Occupational Research and Development, 1983.

Unified Technical Concepts-Application Modules, Volume II, Center for Occupational Research and Development, 1983

GRADING CRITERIA:

_____ Homework	_____ Lab
_____ Tests (minimum number and type)	_____ Attendance
_____ Final Exam	_____ Other

METHOD OF EVALUATION: (avove items)

TESTS AND MAKE-UP POLICY:

GRADING SCALE:

ATTENDANCE POLICY:

ERIC Clearinghouse for Junior Colleges JUN 19 1987